

June 3, 1987

As Mr. Sims noted yesterday, the purpose of Admiral Rogers trip to the Middle East was to establish the events surrounding the attack on the USS STARK and recommend procedures to prevent a recurrence of the incident. He did not attempt to learn who took what actions aboard STARK, nor to assign responsibility.

Before RADM Rogers' team left Iraq, they agreed with their Iraqi counterparts as to specific, detailed procedures which can be used by both sides to preclude a recurrence of this tragic event. We are convinced that, if approved by our two governments, these measures will reduce to an absolute minimum the chances of another attack like the one on STARK. However, the procedures themselves are very sensitive and we will not discuss them.

The following sequence of events is based on RADM Rogers findings.

A. USS STARK (FFG31). The following is a narrative description of the events of 17 May 1987 as regards the actions of USS STARK. This narrative is based on information provided by official U.S. records, by personal observations and interviews of the U.S. team members, and on information provided by their Iraqi counterparts. All times are ZULU time (add four hours for local time, deduct four hours for EDT) on 17 May 1987 unless noted otherwise.

At 0510, USS STARK (FFG31) got underway from Manama, Bahrain, after completing an eight day routine inport upkeep period. At 0930, USS STARK cleared restricted navigational waters and proceeded to a Commander Middle East Force (COMIDEASTFOR) operating area. USS STARK's patrol area was west of the Iranian-Declared Exclusion Zone.

USS STARK was in Readiness Condition III, all air and surface sensors operating, and all weapons systems operational. USS STARK was operating with bright navigational lighting, as required by the International Rules of the Road for a vessel underway at sea.

USS STARK was participating in a two-way computer data exchange with the USS COONTZ, USS LASALLE (CMEF embarked), and USAF AWACS. Information on airborne contacts, such as geographical position, course, speed, altitude, and assumed or confirmed identity, was automatically relayed to each unit participating.

At about 1700, AWACS reported a single aircraft evaluated as unidentified, assumed friendly, assumed Iraqi, which proceeded south down the Persian Gulf.

At 1743, this aircraft was reported by USS COONTZ to be approximately 120NM from USS STARK, on a bearing of 285 degrees. At approximately 1758, USS STARK gained radar contact on the Iraqi aircraft, bearing 260 degrees, at a range of 70NM.

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At 1800, USS COONTZ reported the aircraft position 26-36N/050-51E on a new easterly course 073 degrees, at speed 290 knots, at altitude 3000 feet. The Iraqis agree with the reported position, but contend that the course was 061 degrees. At 1800, USS STARK changed course to 300 degrees, speed 10 knots, position 26-47.4N/051-54.8E. At 1803, USS COONTZ reported to MEF units, "Iraqi aircraft bearing 043 degrees, range 45NM, course 066 degrees, speed 335 knots, altitude 3000 feet, heading toward STARK." At this same time USS LASALLE asked USS STARK if she was monitoring the Iraqi flight, to which USS STARK replied, "Affirmative." During this period, no surface radar contacts were detected by USS STARK within a 25NM range.

At 1806, USS STARK detected, on her SLQ-32 ESM equipment, a radar signal evaluated as a search mode airborne fire control radar. USS STARK correlated the ESM bearing to the radar contact on the aircraft bearing 269 degrees at 27NM. The dead reckoned position of USS STARK, based on an 1800 log entry, was 26-47.4N/051-53.8E.

At 1809, AWACS heard USS STARK issue warnings by voice radio over military air distress 243.0 MHz, to the Iraqi aircraft. In the first warning, USS STARK identified herself as a US Navy warship on a bearing of 078 degrees, at 12 miles. Thirty-seven seconds later, a second warning was issued stating USS STARK's position as bearing 076 degrees, at 11NM from the aircraft.

No reply to either warning was received by AWACS or USS STARK. Between 1808 and 1810 AWACS observed a sharp right turn and speed increase by the aircraft, indicating possible completion of a missile launch.

At 1809, USS STARK reported having detected a fire control lock-on from the airborne radar signal. Within this same period, USS STARK's port side lookout reported a visual contact evaluated as an inbound missile by the bridge watch. General Quarters was sounded between 1809 and 1810.

At 1810, USS STARK initiated MK92 fire control lock-on on the aircraft. About 5 seconds later, USS STARK was hit on the port side, at about frame 100, on the second deck, by a missile which did not detonate. Approximately 25 seconds later, a second missile struck in approximately the same location, and did detonate in crew's compartment 2-100-0-L. The afterbody (airframe) and warhead section of the first missile were recovered in USS STARK, and were positively identified as being EXOCET missile assemblies.

A disparity exists between USS STARK's recorded position and the Iraqi reported target position at the time of missile firing. We are convinced STARK was 10-15 nautical miles outside the Iran-Declared Exclusion Zone. Iraq is convinced STARK was 20-25 miles further east, inside the zone.

**B. IRAQI AIRCRAFT.** The following is a narrative description of the events of 17 May 1987, as regards the action of the Iraqi F-1 aircraft.

The Iraqis stated that this particular pilot's experience was good. The pilot was given a full brief by his commander as regards mission details and the route to be followed. Like other Iraqi pilots he understands English, especially aviation English.

The attack aircraft was reported as a single MIRAGE F-1, modified for extended range and to carry two EXOCET missiles. The aircraft was launched from an unidentified airbase in Iraq.

The pilot reportedly monitored frequencies of 243.0 MHz and 121.5 MHz in the receive only position. These frequencies are used for international emergency/distress calls.

The Iraqis confirmed that the AWACS accurately tracked the MIRAGE F-1 to a point northeast of Bahrain. At this time the pilot turned east to a heading which they believe was 061 degrees but we believe was 073 degrees.

At a point near 26-42N/051-00E, the pilot turned on his fire control radar. He then observed a target on his radar scope. The pilot felt assured that the target was within the Iranian-Declared Exclusion Zone, and that it was therefore Iranian or supporting the Iranian war effort.

At a distance of 40KM from his target, he fired his first missile. Approximately one minute and ten seconds later he fired his second missile and immediately made a hard right turn to proceed home along the reciprocal heading to his attack route.

The Iraqis claim the pilot never received any indication that his aircraft was being targeted by USS STARK. The Iraqis also claim the pilot said that he had not heard any warning calls from USS STARK on frequencies 243.0 MHz UHF/121.5 MHz VHF requesting the Iraqi aircraft to identify itself. The pilot also denied hearing distress calls on these frequencies. AWACS has confirmed that both of these calls were made.

After the attack, the aircraft returned to base. The Iraqis say that the pilot debriefed with his commander, indicating that he had attacked an Iranian vessel at 27-03N/052-12E, inside the Iranian-Declared Exclusion Zone. It was reportedly not until the following day that the pilot realized, through the news media, that the vessel he attacked was USS STARK.

The essential difference in the US and Iraqi versions of what occurred in the attack on USS STARK concerns the exact locations of both the Iraqi MIRAGE F-1 and USS STARK throughout the attack. The Iraqis maintain that their aircraft fired two missiles at a maritime target located in the Iranian-Declared Exclusion Zone. They consider maritime shipping in this zone to be legitimate targets connected with the Iranian war

effort. As proof of their aircraft's location, they agree with the track verified by US AWACS for the north to south outbound leg of the F-1 mission. They state that their record of this flight corresponds to the US AWACS version through the F-1's turn eastward in the vicinity of Bahrain. From that point, they reject the F-1 track provided by AWACS, USS COONTZ, and USS STARK. Instead, they rely on the data provided by the inertial navigation system (INS) of the F-1. They say this system has proven itself to be highly reliable. The Iraqis strongly maintain that the evidence supports their assertion that USS STARK was in the Iranian-Declared Exclusion Zone when attacked. The United States remains certain that the wealth of position data provide by AWACS, USS STARK, USS COONTZ, and USS LASALLE confirm that the Iraqi F-1 struck USS STARK while she (STARK) was approximately 12NM to the west of the Iranian-Declared Exclusion Zone.

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## USS STARK (FFG-31) AFFAIR

On **17** May 1987, while underway in the Persian Gulf at 10 knots, an unidentified aircraft was seen on the radar, approaching the ship. The aircraft, an Iraqi French built MIRAGE F-1<sup>1</sup> was first spotted at 200 miles out. The aircraft was tracked as it approached by an overhead AWACS aircraft, based in Saudi Arabia, and the ship itself. At 43 miles out, STARK detected that the aircrafts radar had locked on her. At the sametime, the ships Tactical Action Officer(TAC), LT. Basil E. Moncrief, USN refused a request by an enlistedman on watch to warn the aircraft away. The aircraft was finally warned when it was 13 nautical miles out, and a second time at 11 nautical miles. Unfortunately, the first EXOCET missile was fired at 22 miles out and the second at 17 miles out. The missile detachment and the missiles terminal homing radar were never picked up.<sup>2</sup> The two missiles hit on the portside of the superstructure, just below the port bridge wing. The hits occurred in the Mark 13 missile launcher control room, a Chief Petty Officer (CPO) and enlistedman living quarters. The hole was approx. 15 feet wide. The only warning of the approaching missiles was when a lookout spotted the missile 25 seconds out, and approaching, from impact. The first missile was a dud, but still had about 2/3's of it fuel left aboard when it hit and this was the basic cause of the fires. The second hit shortly after and exploded. This occurred at 2210 Persian Gulf time; 1410 Wasington time. The ship went Dead in the Water (DIW) billowing smoke. She gradually took about a 10 degree list. With the help of a fire-fighting tug that arrived on the scene and guarded by CONYNGHAM (DDG-17) and one other ship, the fires were put out and the ship pumped out. The ship was towed into Bahrain by CONYNGHAM even though the engineering plant was intact. This was done because the ships crew was so exhausted by efforts to save the ship they needed time to rest and because of the casualties. TOTAL CASUALTIES: 37 dead (only 36 bodies found) and 2 seriously wounded along with 7 minor wounded.

Comments: The warhead of the first EXOCET was found on 21 May 1987 and disarmed. The alarm in the CIC that goes off to warn of incoming missiles was turned off because it went off at any excuse and became annoying. When the missiles hit, an enlistedman in the Mark 13 magazine stayed at his station spraying water on the missiles to keep them cool as the fires approached. The fires got as close as 6 feet before extinguished. Magazine never ordered flooded. Only that man kept the missiles from the danger of "cooking off."

### FOOTNOTES:

1. The MIRAGE was specially modified by Iraq to carry one EXOCET under each wing and an external fuel tank under the belly. The same fighter only carried one EXOCET in the 1982 Falklands War which is what they are built to do. The Iraq pilot was experienced, having 800 hours in the air. There are several reports which say he was inexperienced because the AWACS aircraft said the planes track was erratic and he couldn't control it. Neither could most pilots with an overloaded plane.
2. The EXOCET has been modified since the 1982 Falklands War. The plane carrying the missile now sets the missiles course and the

missiles terminal homing radar doesn't come on until virtually the last moment. This modification makes the missiles harder to pick up because there are no electronic omissions and the missile is a surface-skimmer.

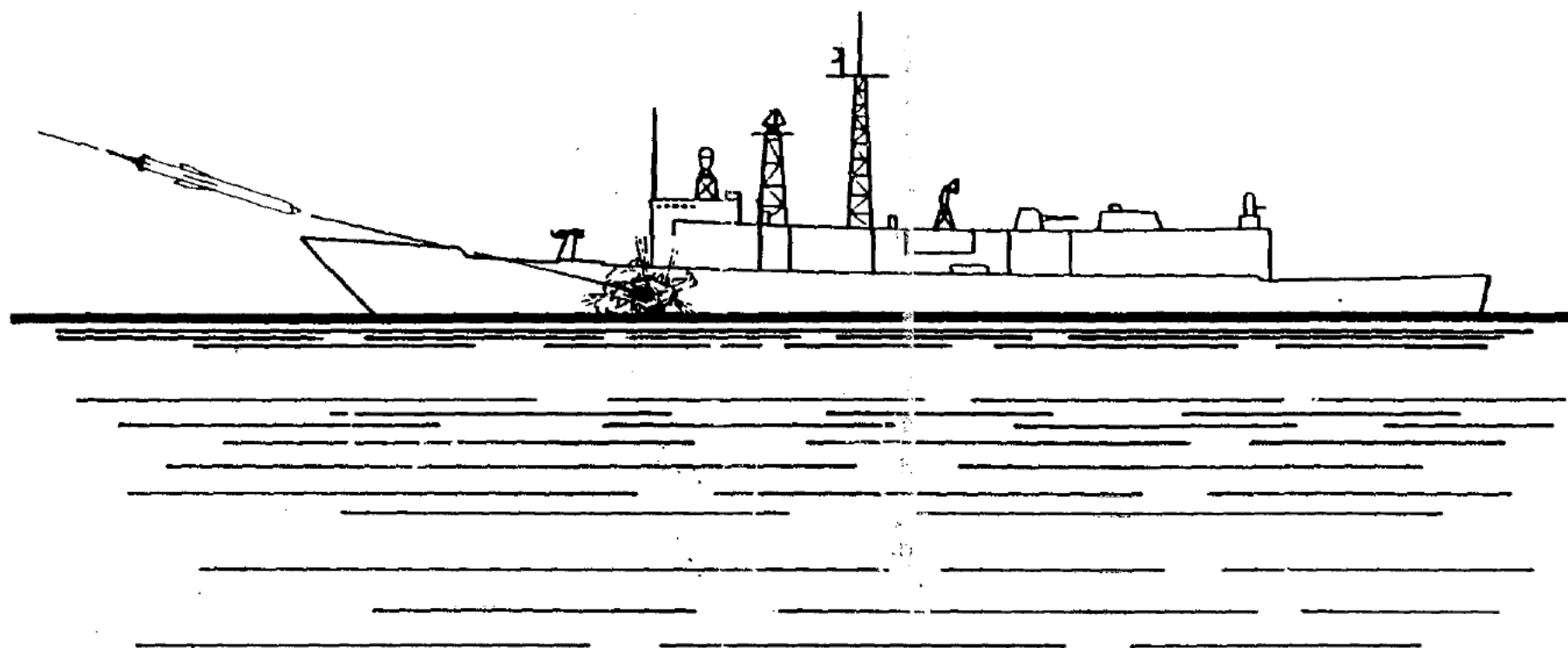
GENERAL: On 19 June 1987, Captain Glen Brindel, Commanding Officer; LCDR Raymond Gajan, Jr., Executive Officer and LT. Basil E. Moncrief, the ships TAO were relieved and flown back to the United States to face court-martials.

The VULCAN/PHALANX, as installed on the FFG-7 Class, has a "blind spot" of 30 degrees off the port and starboard bows because of the superstructure. The lookout on the STARK that reported the missile coming in said it approached at a point 10 to 30 degrees off the port bow.

Post-script: On 1 June 1987, USS ACADIA (AD-42) arrived at Bahrain to repair STARK for her voyage home. Repairs to take 4-6 weeks at which time STARK will return to her homeport at Mayport. Permanent repairs will be done at Charleston Naval Shipyard.

By: Samuel Loring Morison, 26 June 1987

**USS STARK (FFG-31)**  
**PERSIAN GULF OPERATIONS**  
**17 MAY 1987**



THIS AFTERNOON I WILL BRIEF YOU ON THE FINDINGS OF A FFG 7 PANEL CONVENED BY THE SECRETARY OF THE NAVY TO ANALYZE THE "TECHNICAL ASPECTS" OF THE STARK INCIDENT. THE STORY OF STARK IS ONE THAT WILL REVEAL A TOUGH SHIP, A DETERMINED AND HEROIC CREW AND A NAVY APPROACH TO SURVIVABILITY.

ON THE NIGHT OF 17 MAY 1987, WHILE OPERATING INDEPENDENTLY IN THE PERSIAN GULF, USS STARK WAS STRUCK BY TWO AIR-TO-SURFACE EXOCET MISSILES LAUNCHED FROM AN IRAQI F-1 AIRCRAFT AND SURVIVED. THE PHYSICAL IMPACT OF BOTH MISSILES, THE INCENDIARY EFFECT OF THE SUBSTANTIAL AMOUNT OF BURNING RESIDUAL MISSILE FUEL AND THE DETONATION OF THE SECOND MISSILE'S WARHEAD TRIGGERED A SHIPBOARD INFERNO.

THE DETERMINED AND UNDAUNTING ACTIONS OF A WELL-TRAINED CREW, THE ASSISTANCE FROM OTHER FORCES, INCLUDING A COMMERCIAL SALVAGE TUG, THE FAVORABLE WEATHER CONDITIONS AND THE INHERENT ABILITY OF THE FFG 7 DESIGN, DESPITE ITS RELATIVELY SMALL SIZE, TO SUSTAIN DAMAGE AND SURVIVE, ARE THE REASONS STARK WAS ABLE TO RETURN WITHIN WEEKS OF THE INCIDENT UNDER ITS OWN POWER TO HOMEPORT.

WHAT HAPPENED IN STARK?

AT ABOUT 9:12 PM ON 17 MAY 1987, THE FIRST OF TWO EXOCET MISSILES HIT THE PORT SIDE OF THE SHIP APPROXIMATELY 13 FEET ABOVE THE WATER LINE, UNDER THE PORT BRIDGE WING. WITH AN IMPACT ANGLE OF ABOUT 35 DEGREES OFF THE BOW AND A SPEED OF NEARLY 600 MPH, THE MISSILE SEVERED FIREFIGHTING WATER PIPES SUPPLYING THE FORWARD PART OF THE SHIP, SEPARATED INTO TWO LARGE PIECES, BUT FAILED TO DETONATE. THE TWO PARTS, THE AIRFRAME AND THE WARHEAD, PASSED THROUGH ONE OF THE CREW'S SLEEPING QUARTERS AND CONTINUED DIAGONALLY ACROSS THE DECK SPREADING NEARLY 120 POUNDS OF BURNING RESIDUAL SOLID PROPELLANT IN THEIR WAKES. THE UNEXPLODED WARHEAD CAME TO REST AGAINST THE STARBOARD HULL PLATING.

20 TO 30 SECONDS AFTER THE FIRST HIT, THE SECOND MISSILE, APPROACHING FROM THE SAME ANGLE OFF THE BOW, IMPACTED THE SHIP APPROXIMATELY 8 FEET AFT OF THE FIRST MISSILE'S POINT OF ENTRY. THIS TIME, THE WARHEAD DETONATED 5 FEET INSIDE THE HULL. THE RESIDUAL PROPELLANT FROM BOTH MISSILES COMBINED WITH THE HEAT OF DETONATION AND A CONTINUOUS OXYGEN SUPPLY TO CREATE AN IMMEDIATE INFERNO IN THE SECOND DECK BERTHING COMPARTMENT.

THE INITIAL FIRE RESULTING FROM THE UNSPENT FUEL OF THE MISSILES BURNED AT APPROXIMATELY 3000 TO 3500 DEGREES FAHRENHEIT FOR ABOUT TWO TO THREE MINUTES. THE RADIANT

HEAT, IN TURN, CAUSED AN IMMEDIATE IGNITION OF ALL COMBUSTIBLES IN THE BERTHING SPACE. OVERHEAD TEMPERATURES QUICKLY REACHED 1400 TO 1500 DEGREES FAHRENHEIT AND ADJACENT SPACES RAPIDLY FILLED WITH ACRID, BLACK SMOKE.

THERE ARE SEVERAL ASPECTS OF THE STARK FIRE THAT CONTRIBUTED TO ITS INTENSITY AND LONGEVITY. FIRST, THE EXOCETS WERE LAUNCHED AT CLOSE RANGE, THEREBY CARRYING A SIGNIFICANTLY HIGHER RESIDUAL FUEL LOAD INTO THE TARGET. IN ADDITION, THE FIRST MISSILE RUPTURED A FIREFIGHTING WATER MAIN THAT SUPPLIED THE FORWARD PART OF THE SHIP. THIS, IN TURN, HAMPERED INITIAL FIREFIGHTING EFFORTS AND CAUSED FLOODING THAT RAPIDLY INDUCED A PORT LIST CONDITION.

THE SECOND MISSILE DETONATION HAD FAR-REACHING RAMIFICATIONS:

- 0 EXTERNALLY, IT CREATED A GAPING HOLE IN THE HULL AND DAMAGED THE BRIDGE WING, BULWARK AND MAIN DECK SUPERSTRUCTURE AREAS ON THE PORT SIDE, ALLOWING FREE AIR VENTILATION FOR COMBUSTION AND RESTRICTING FIRE TEAM ACCESS;
- 0 INTERNALLY, THE WARHEAD DETONATION DESTROYED THREE PRIMARY, FIREFIGHTING WATER MAIN, ISOLATION VALVES AND DAMAGED SEVERAL WATERTIGHT DOORS THAT WERE NEEDED TO LIMIT THE SPREAD OF SMOKE AND FIRE; AND,
- 0 THE THERMAL PULSE SUPPLIED INSTANTANEOUS HEAT TO THE BERTHING COMPLEX AND THE SECOND MISSILE INTRODUCED MORE BURNING PROPELLANT INTO THE SPACE

AT THIS POINT, IT WOULD BE USEFUL TO BRIEFLY REVIEW THE SEQUENCE OF EVENTS AS THE STARK'S CREW FOUGHT THROUGH THE NIGHT TO BRING THE CONFLAGRATION UNDER CONTROL AND TO SAVE THE SHIP. THIS SEQUENCE IS A RECONSTRUCTION OF EVENTS BY THE MEMBERS OF THE DAMAGE ASSESSMENT TEAM THAT ARRIVED ON-SCENE IN BAHRAIN WITHIN DAYS OF THE INCIDENT.

WITHIN MINUTES OF BEING STRUCK BY THE TWO MISSILES, THE STARBOARD PASSAGEWAY AND CREW LIVING COMPLEX ON THE SECOND DECK, FORWARD OF THE BARBER SHOP, WERE ON FIRE AND THICK SMOKE HAD FILLED THE AREAS ADJACENT TO THE BLAST.

ALTHOUGH POWER GENERATION EQUIPMENT REMAINED FULLY OPERATIONAL, ELECTRICAL SHORT CIRCUITS CAUSED TEMPORARY INTERRUPTIONS THAT RESULTED IN A LOSS OF FIREFIGHTING WATER PRESSURE UNTIL THE FIRE PUMPS COULD BE RESTARTED.

FURTHERMORE, DUE TO THE LOCATION OF THE DAMAGE AREA AND THE INTENSITY OF THE CONFLAGRATION, ONLY ONE OF THREE DAMAGE CONTROL LOCKERS (REPAIR III) COULD BE READILY

ACCESSED FOR FIREFIGHTING EQUIPMENT AND SUPPLIES.

EIGHT MINUTES AFTER INITIAL IMPACT, CONDITION "ZEBRA", OR THE HIGHEST STATE OF WATERTIGHT INTEGRITY, HAD BEEN SET THROUGHOUT THE UNDAMAGED SECTIONS OF THE SHIP, FIREFIGHTING WATER PRESSURE HAD BEEN RESTORED TO ALMOST 50 PERCENT CAPACITY AND THE FIRST FIREFIGHTING TEAMS WERE ON-SCENE, COMBATTING THE BLAZE.

WITHIN 15 MINUTES, THE SHIP WAS LISTING 11.5 DEGREES TO PORT AS A RESULT OF WATER FLOWING FROM THE RUPTURED FIREMAIN, WHICH HAD YET TO BE ISOLATED.

BY 9:30, THE COMBAT INFORMATION CENTER, TWO DECKS ABOVE, WAS ALREADY PARTIALLY FILLED WITH SMOKE AND THE MISSILE MAGAZINE HAD TO BE COOLED WITH FIREFIGHTING WATER.

AS A RESULT OF THE RUPTURED FIREMAIN, THE ONLY MEANS OF SUPPLYING FIREFIGHTING WATER TO THE FORWARD MAIN DECK AREA AND THE MISSILE MAGAZINE WAS THROUGH THE USE OF A PORTABLE, GAS-DRIVEN PUMP, OR NAVY P-250.

BY 9:38, THE RUPTURE IN THE FIREMAIN HAD BEEN ISOLATED AT THE NEXT MOST ACCESSIBLE VALVE, RESULTING IN NO WATER FORWARD OF FRAME 180, AS SHOWN, BUT FULL FIREFIGHTING WATER PRESSURE WAS RESTORED TO THE REMAINDER OF THE SHIP.

BY 9:50, THE SHIP WAS LISTING 16 DEGREES AS A RESULT OF THE WATER FROM THE NOW ISOLATED FIREMAIN RUPTURE, AS WELL AS THE WATER BEING USED TO FIGHT THE FIRE. CREW MOVEMENT BECAME EXTREMELY DIFFICULT. THE FIRE CONTINUED TO SPREAD AFT, THROUGHOUT THE CHIEF PETTY OFFICER'S QUARTERS.

BY 10 PM, LESS THAN ONE HOUR AFTER THE INITIAL MISSILE HIT, IT WAS NECESSARY TO BEGIN ROTATING FIREFIGHTING TEAMS.

AT 11 O'CLOCK, THE REPORT OF A FIRE IN THE RADAR EQUIPMENT ROOM INDICATED THAT THE FIRE WAS SPREADING VERTICALLY. THIS DEVELOPMENT WAS CAUSED BY AN "OVEN EFFECT", OR THE CONDUCTION OF HEAT THROUGH THE OVERHEAD TO THE SPACE ABOVE. HORIZONTAL SPREAD OF THE FIRE WAS EFFECTIVELY BROUGHT UNDER CONTROL.

ALTHOUGH CAPABLE OF CONTINUING TOWARD BAHRAIN UNDER HER OWN POWER, AT 11:05 IT BECAME NECESSARY TO STOP THE SHIP IN ORDER TO ALLOW THE PORTABLE PUMP ON THE FOCSE TO MAINTAIN SUCTION.

AT 11:30, A COMMERCIAL SALVAGE TUG, EQUIPPED WITH FIREFIGHTING WATER CANNONS, CAME ALONGSIDE AND WAS UTILIZED TO HELP COOL THE STARBOARD SIDE OF THE SHIP AND THE MISSILE

MAGAZINE EXTERIOR.

BY 1:14 ON THE MORNING OF THE 18TH, FIRES ON THE DAMAGE CONTROL DECK HAD BEEN EXTINGUISHED UP TO FRAME 140. AT THIS TIME, HOWEVER, THE SHIP'S SUPPLY OF OXYGEN BREATHING APPARATUS CANISTERS WAS EXHAUSTED, HALTING EFFECTIVE FIREFIGHTING PROGRESS, AND FIRES REIGNITED IN SOME AREAS.

AT 1:34 AM, A BOAT FROM USS WADDELL ARRIVED WITH DAMAGE CONTROL SUPPLIES AND THE MUCH NEEDED OXYGEN CANISTERS.

AT 2 AM, MORE OXYGEN CANISTERS ARRIVE FROM THE MIDDLE EAST FORCE FLAGSHIP. (LASALLE) ALSO AT THIS TIME, DEWATERING EFFORTS WERE INITIATED TO RECOVER THE SHIP FROM ITS 16 DEGREE LIST.

BY NOON, FATIGUE WAS BECOMING A CRITICAL FACTOR IN SUSTAINING THE FIREFIGHTING EFFORT, AS WAS THE LACK OF DRINKING WATER DUE TO LOSS OF POWER TO THE PUMPS THAT SUPPLIED FRESH WATER.

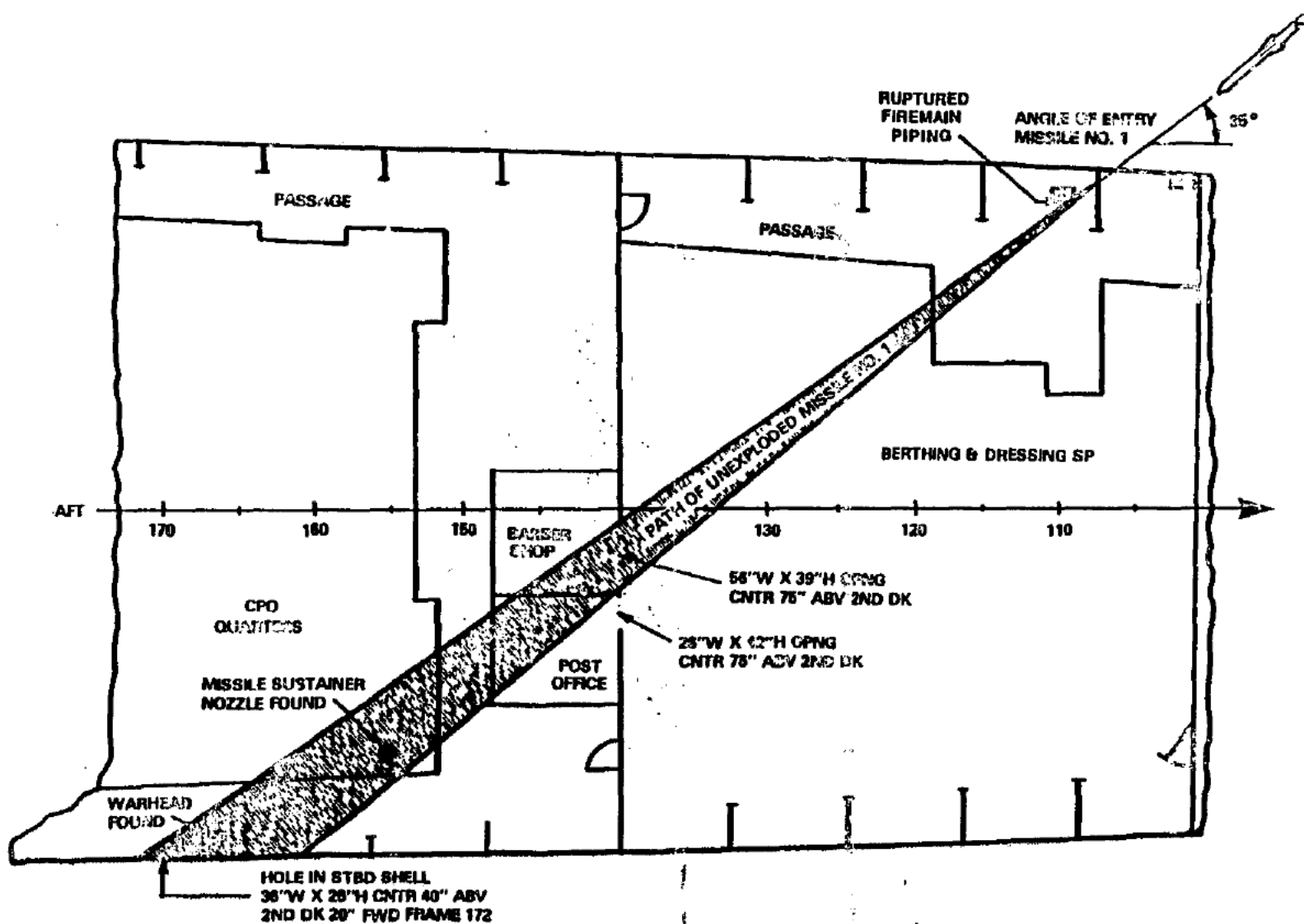
AT 3:52, FIREFIGHTING TEAMS ARRIVED FROM 2 OTHER USN SHIPS. FRESH FIREFIGHTERS, THREE WERE NOW ENOUGH PEOPLE ON BOARD TO GUARD AGAINST REFLASH OF THE FIRES THAT HAD BEEN EXTINGUISHED.

DEWATERING EFFORTS CONTINUED IN THE SUPERSTRUCTURES AND IT BECAME NECESSARY TO CUT HOLES IN THE UPPER DECKS TO ALLOW WATER, ACCUMULATING TOPSIDE, TO DRAIN.

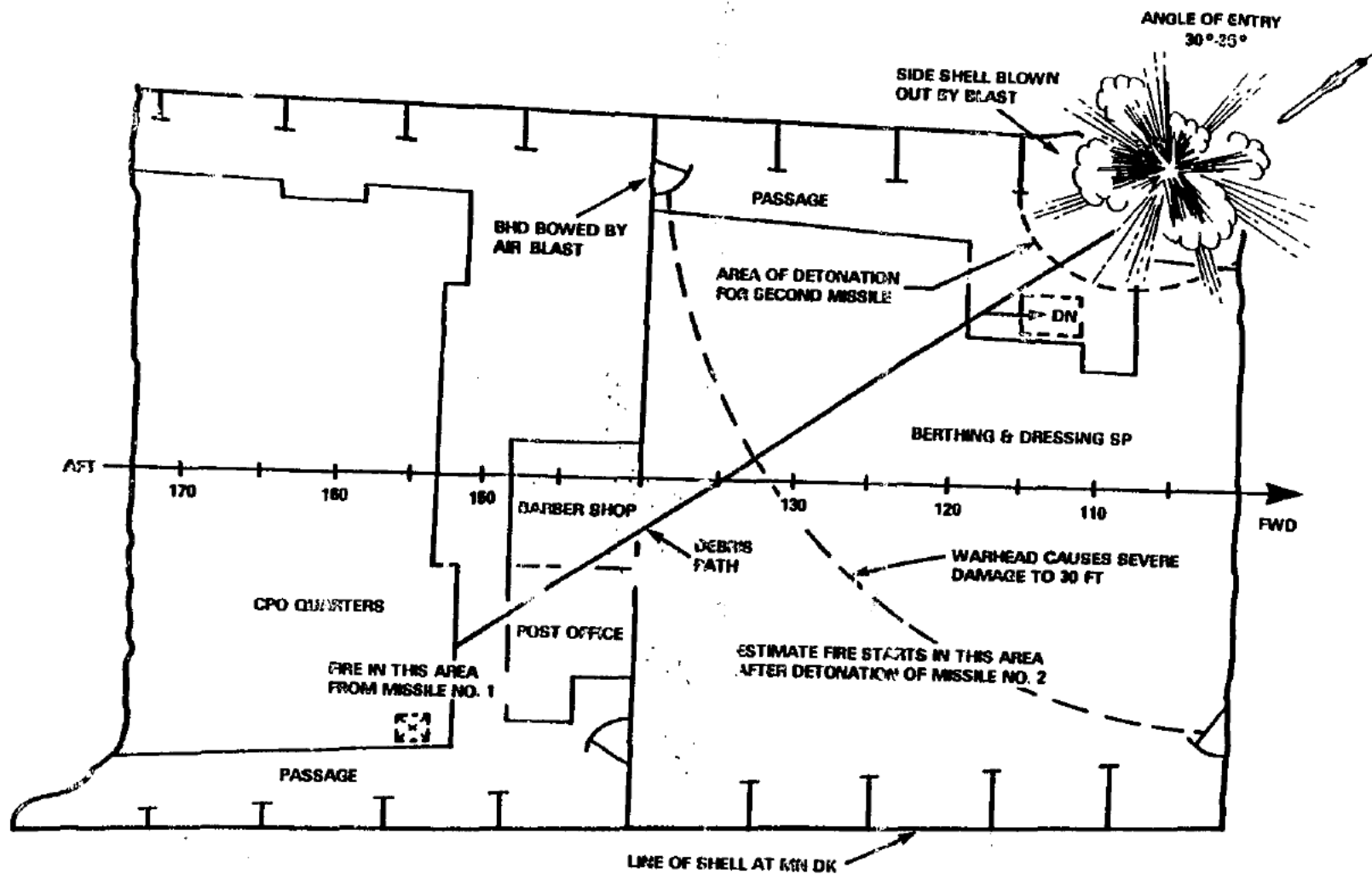
AT 0900, THE VERTICAL FIRE SPREAD CONTINUED AS EVIDENCED BY THE LOSS OF STRUCTURAL STRENGTH AND THE FAILURE OF THE OVERHEAD IN THE RADAR EQUIPMENT ROOM AND THE COLLAPSE OF THE DECK IN THE CAPTAIN'S CABIN. BY 10 AM ON THE 18TH THE FIRE WAS CONFINED TO THE RADAR EQUIPMENT ROOM AND THE COMBAT INFORMATION CENTER.

BY 1 PM, THE FIRE IN THE RADAR EQUIPMENT ROOM WAS OUT AND BY 5 O'CLOCK THE FIRE IN THE COMBAT INFORMATION CENTER HAD BEEN EXTINGUISHED. IN TOW BY USS CONYNGHAM THAT EVENING, THE SHIP PROCEEDED TO BAHRAIN. ISOLATED REFLASHES CONTINUED THROUGHOUT THE NIGHT BUT WITHIN TWO DAYS OF THE ATTACK, THE SHIP WAS ON AN EVEN KEEL, WITH EMERGENCY POWER RIGGED, HOT SPOTS COOLED AND MOORED OUTBOARD OF USS LASALLE AT AN ANCHORAGE IN BAHRAIN.

# MISSILE NO. 1 SECOND DECK IMPACT



# MISSILE NO. 2 SECOND DECK IMPACT



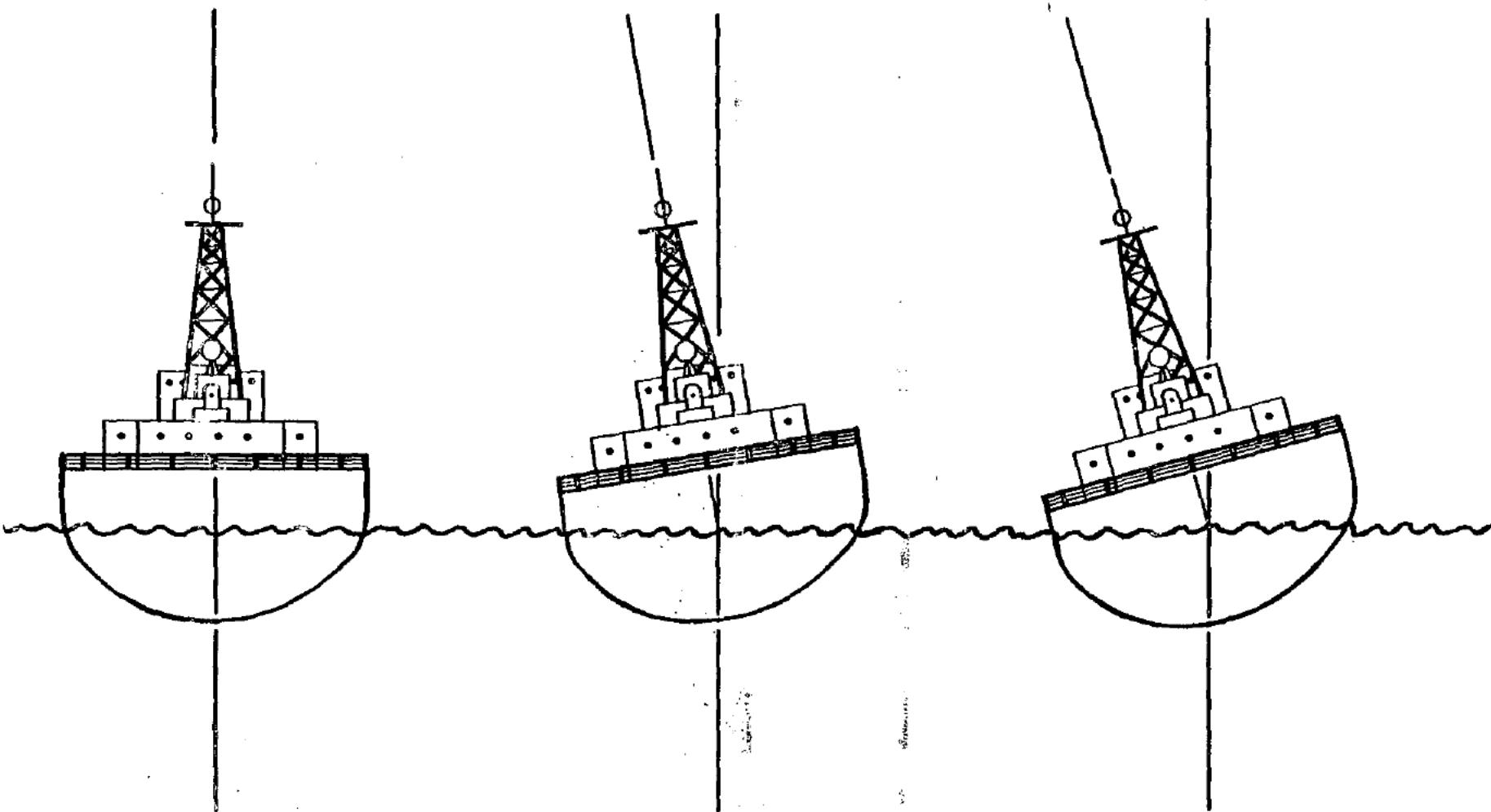
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11.5°

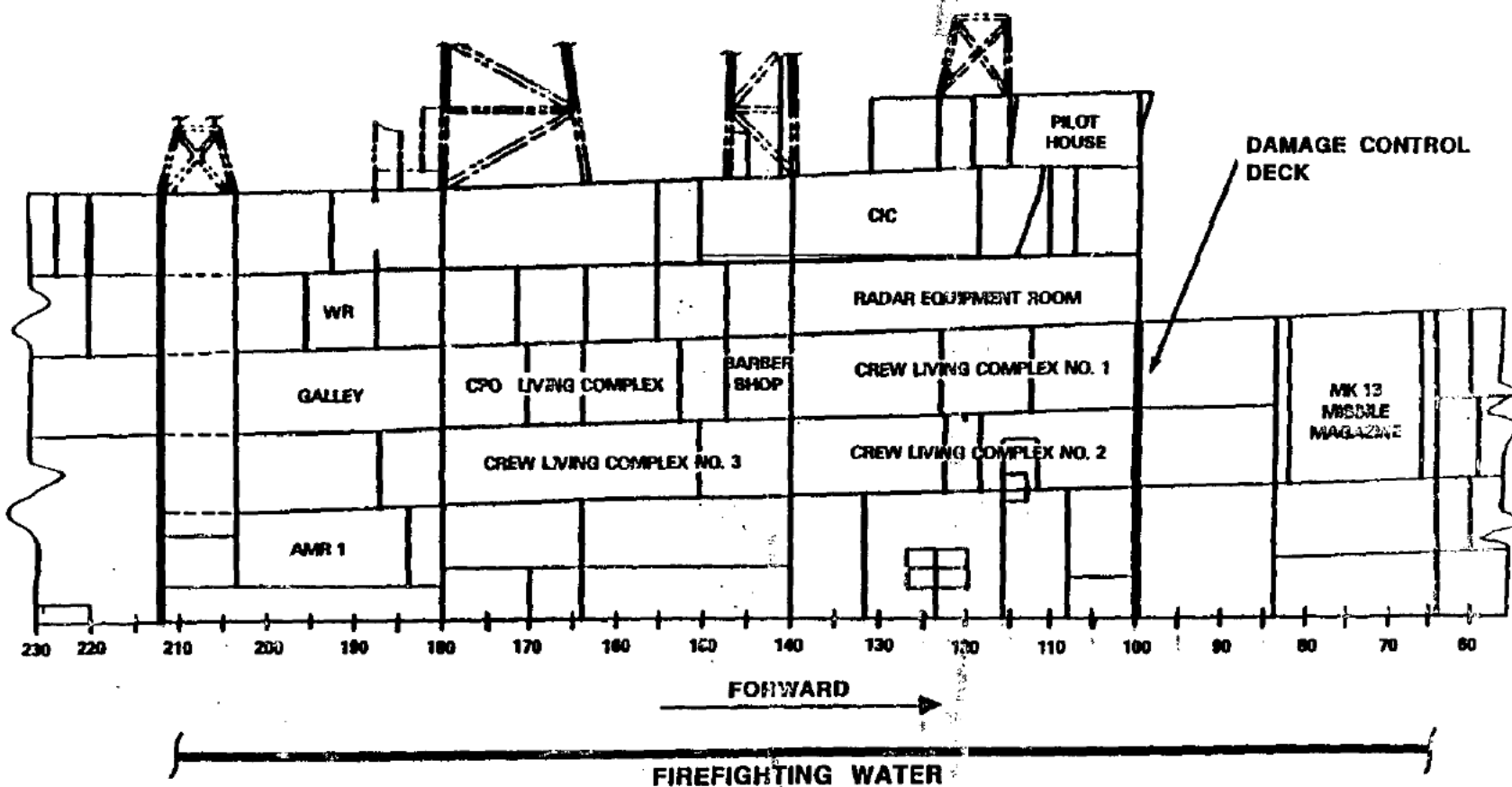
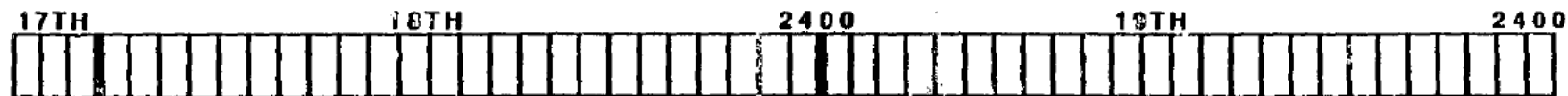
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18°

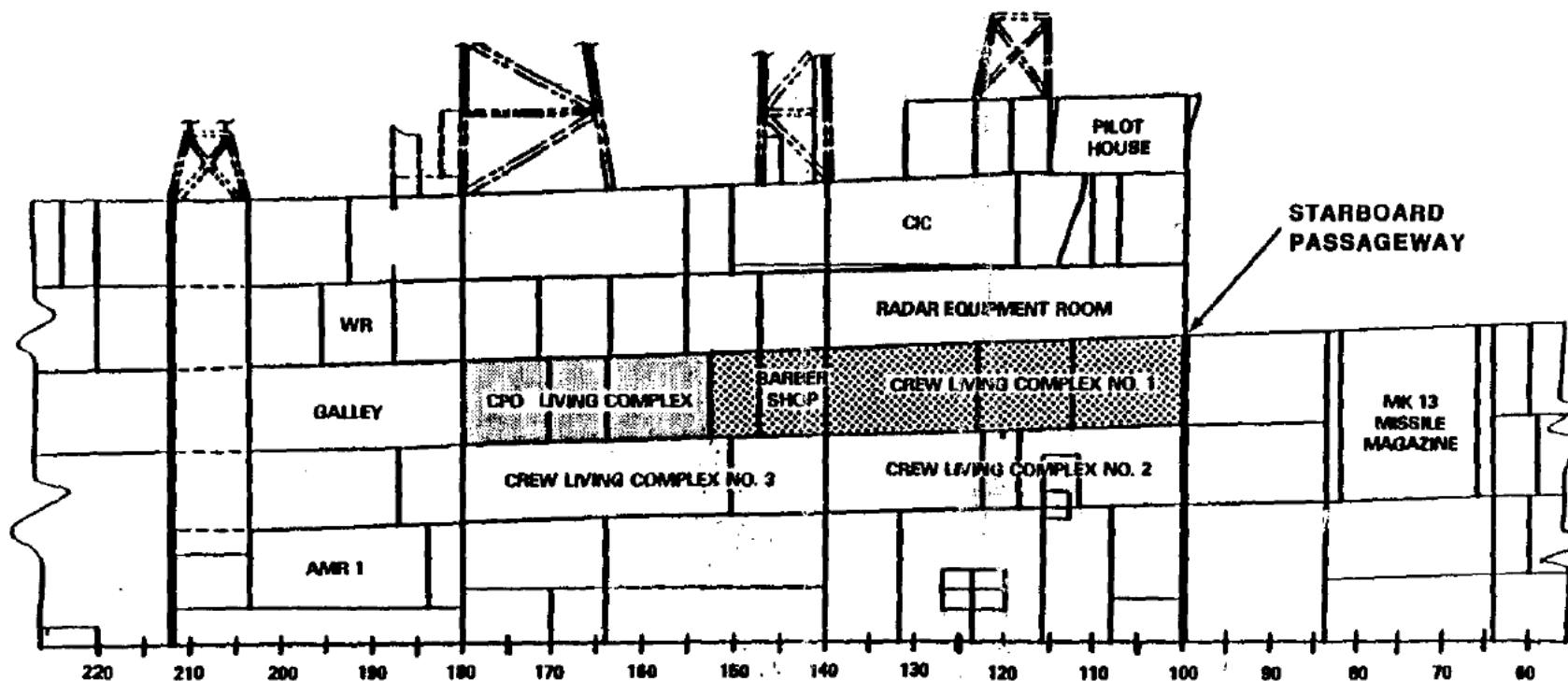
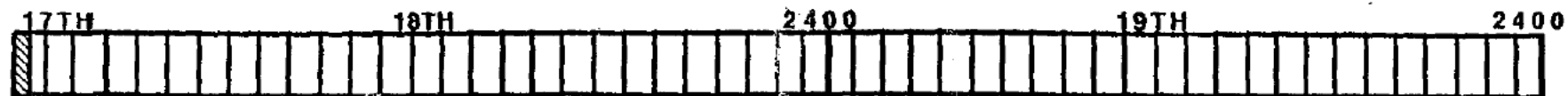
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# FFG 7 SPACE ARRANGEMENT STARBOARD SIDE VIEW



■ = HORIZONTAL FIRE BOUNDARY



60 PSIG (NORMAL PRESSURE 125)

= FIRE

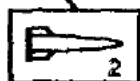
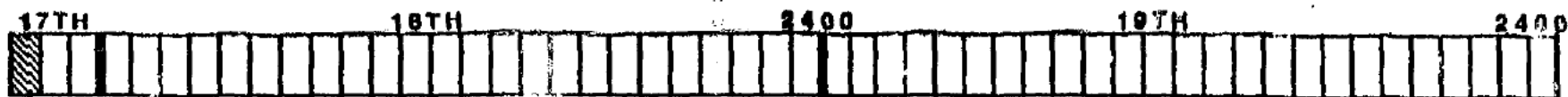
= HEAT

= HORIZONTAL FIRE BOUNDARY

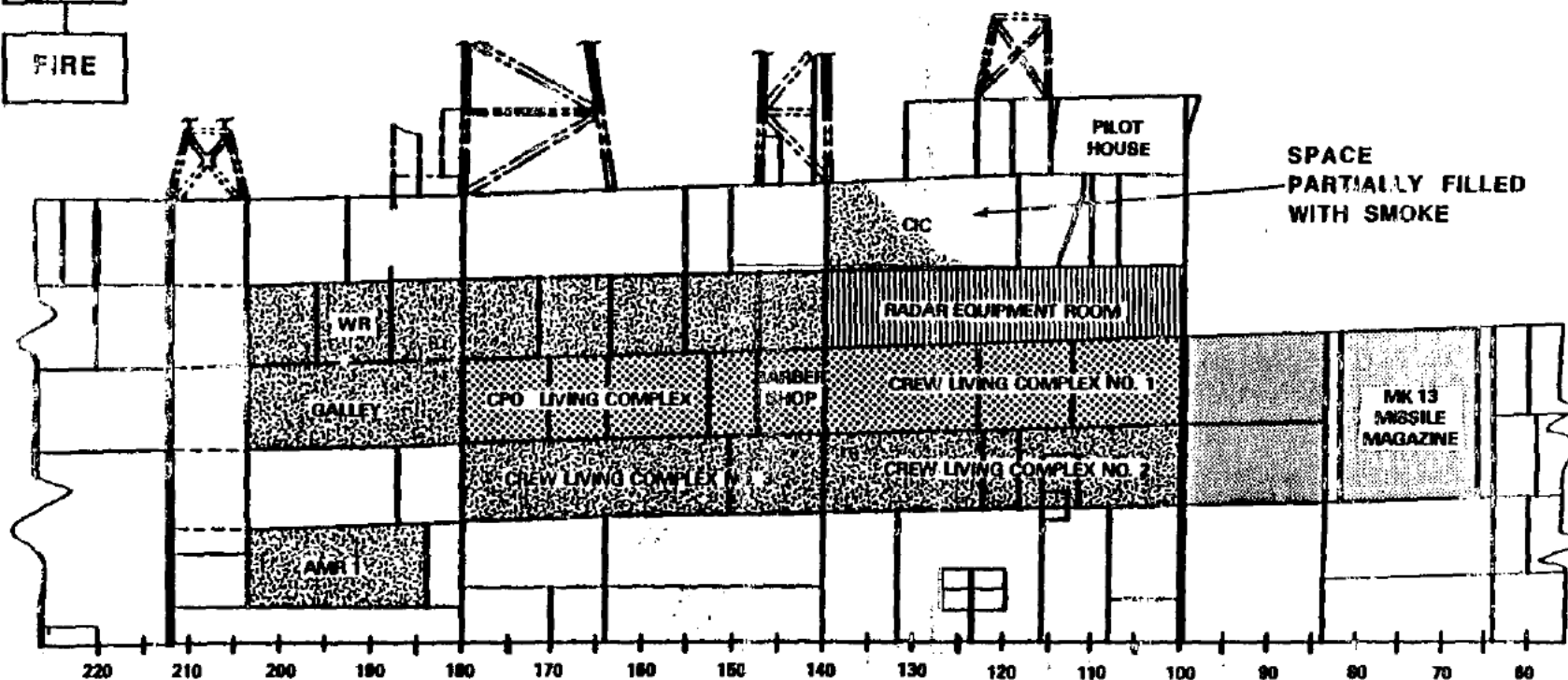
= FIREFIGHTING WATER

= RUPTURE

0 PSIG



FIRE



FULL PRESSURE

= FIRE

= OVEN EFFECT

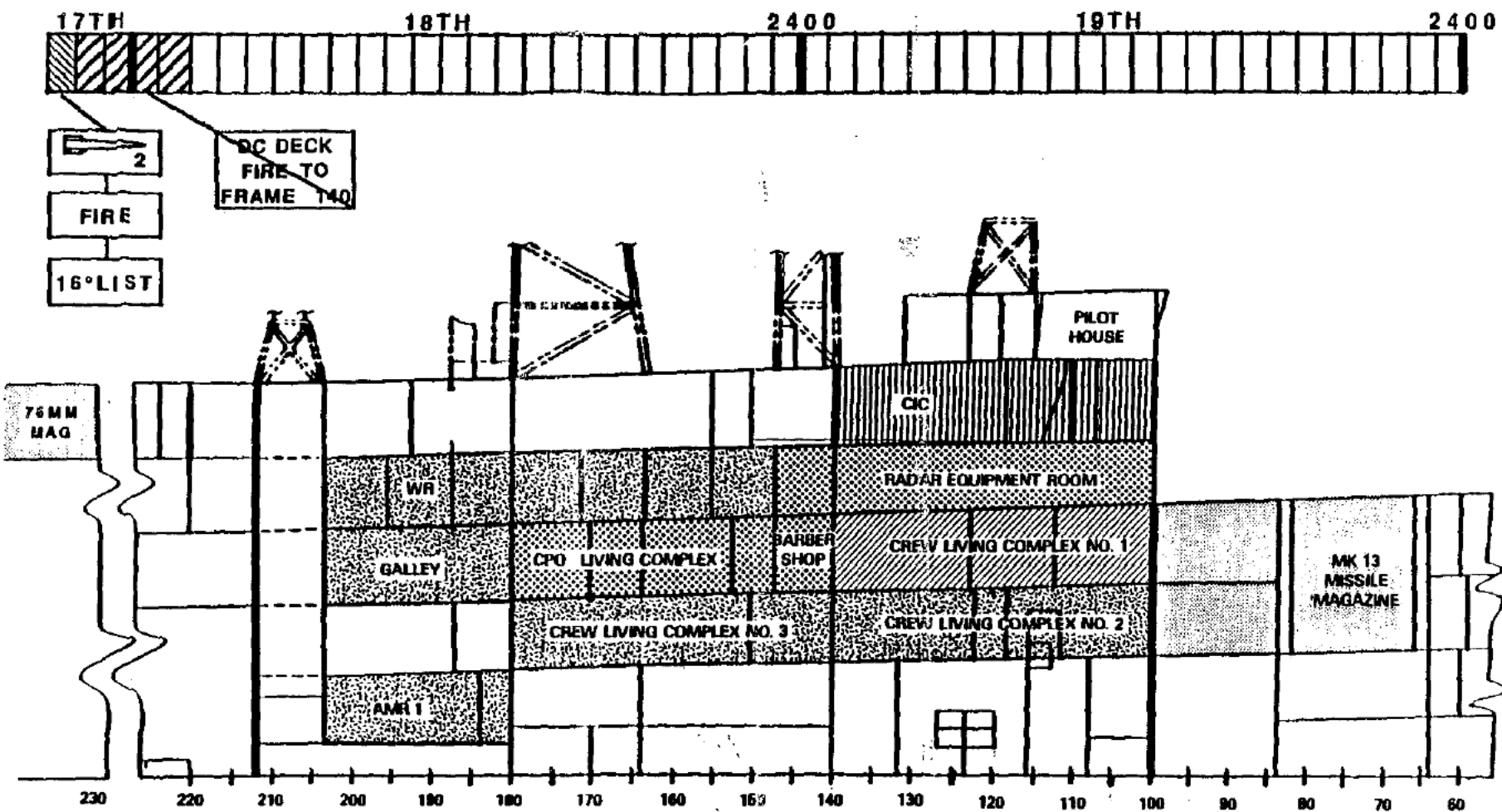
= HEAT

= FIREMAIN

= SMOKE

= ISOLATED FIREMAIN

= HORIZONTAL FIRE BOUNDARY



FULL PRESSURE

- |  |         |  |                            |  |                     |
|--|---------|--|----------------------------|--|---------------------|
|  | = FIRE  |  | = VERY INTENSE FIRE        |  | = FIREMAIN          |
|  | = HEAT  |  | = OVEN EFFECT              |  | = ISOLATED FIREMAIN |
|  | = SMOKE |  | = HORIZONTAL FIRE BOUNDARY |  |                     |

# WHAT WORKED WELL/NOT SO WELL

## WORKED WELL

- CREW TRAINING
- HORIZONTAL FIRE/SMOKE CONTAINMENT
- EMERGENCY ESCAPE BREATHING DEVICES (EEBD)/OXYGEN BREATHING APPARATUS (OBA)
- STRUCTURAL ALUMINUM
- PORTABLE FIREFIGHTING WATER PUMP (P-250)
- ELECTRIC SUBMERSIBLE PUMPS
- FLOOD LANTERNS
- ELECTRICAL MULTI-CABLE PENETRATORS

## NOT SO WELL

- VERTICAL CONTAINMENT (PASSIVE)
- VERTICAL FIREFIGHTING DOCTRINE (ACTIVE)
- DAMAGE CONTROL PROTECTIVE CLOTHING
- EMERGENCY CUTTING TORCHES
- GASOLINE SUPPLY FOR P-250 PUMP
- DAMAGE CONTROL COMMUNICATIONS EQUIPMENT
- HELMET/BATTLE LANTERNS
- FIREFIGHTING WATER SYSTEM DESIGN
  - PUMP/VALVE LOCATION AND OPERATION